

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-189708

(43)Date of publication of application : 13.07.1999

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(51)Int.Cl.

**C08L 67/00**

**B42D 15/10**

**// C08G 63/199**

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(21)Application number : **09-360810**

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(22)Date of filing : **26.12.1997**

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### (54) **RESIN COMPOSITION FOR CARD**

(57)Abstract:

**PROBLEM TO BE SOLVED:** To obtain a resin composition for card capable of responding the demand of conservation of global environment, hardly causing burr in punching, consequently capable of being inexpensively manufactured, sufficiently securing the mechanical strength of a card base material itself.

**SOLUTION:** This resin composition for card comprises a main resin component composed of a copolymerized polyester resin obtained by substituting 10-70% of an ethylene glycol component in a polyethylene terephthalate and one or more modifiers selected from a synthetic rubber and a styrene based resin as constituent components.

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### LEGAL STATUS

[Date of request for examination] 17.12.2004

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against  
examiner's decision of rejection]

[Date of extinction of right]

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## CLAIMS

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[Claim(s)]

[Claim 1] The resin constituent for cards which comes to contain the subject resinous principle which consists of copolymerized polyester resin which permuted 10 - 70% of the ethylene glycol component in polyethylene terephthalate by cyclohexane dimethanol, and one sort or two sorts or more of modifiers chosen from synthetic rubber and styrene resin.

[Claim 2] The resin constituent for cards according to claim 1 which comes to carry out 2-50 weight section content of the modifier to said subject resinous principle 100 weight section.

[Claim 3] The resin constituent for cards according to claim 1 or 2 which a subject resinous principle consists of mixture of said copolymerized polyester resin and polycarbonate resin, and has the weight ratio of copolymerized polyester resin / polycarbonate resin in the range of 20 / 80 - 90/10.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the resin constituent used for the card substrate of the plastic card as information record media, such as a mag-stripe card and an IC card.

[0002]

[Description of the Prior Art] Although the application of the plastic card as an information record medium is carrying out sudden expansion size in recent years, as an ingredient of the card substrate, it is cheap, and since it excels in embossing nature, vinyl chloride resin is most used widely.

[0003] By the way, if the above-mentioned vinyl chloride resin carries out incineration processing, it will be known generating the hydrogen chloride leading to acid rain and that this hydrogen chloride will contract the life of an incineration processing facility, and it is further reported by recently that it is the ingredient which can cause dioxin generating from an incinerator. It is strongly requested in such a situation from a viewpoint which secures the environmental protection and insurance health in earth level that a non-vinyl-chloride-resin ingredient should be substituted also for the ingredient of the above-mentioned card substrate.

[0004] In order to respond to such a request, what used ABS plastics and PET

(polyethylene terephthalate) resin as an ingredient of a card substrate is adopted partly.  
[0005]

[Problem(s) to be Solved by the Invention] However, deburring work was [ that it is easy to produce weld flash ] needed on the occasion of punching at the time of manufacture, and the card using the above-mentioned ABS plastics or PET had the problem that productive efficiency was low. Moreover, there were a mechanical strength and a difficulty that it is not enough, for example, bending reinforcement when a notch enters is low. Furthermore, although the card might be left in the location which is easy to become an elevated temperature under sunshine like [ in the automobile under stop ], it was not what has sufficient thermal resistance which can respond also in such a case.

[0006] That it is made in view of this technological background, and it is [ therefore ] hard to produce weld flash in the case of punching while closing responding to the request of earth environmental protection, if, this invention can be cheaply manufactured with high productive efficiency, and sets it as the 1st object to offer the resin constituent for cards which can moreover fully secure the mechanical strength of the card base material itself.

[0007] Moreover, this invention sets it as the 2nd object to offer the resin constituent for cards which can secure the outstanding thermal resistance which does not deform under an elevated temperature like [ in the automobile under stop under sunshine ].

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned object, it found out that a mechanical strength could be substantially improved by this invention person being able to prevent effectively weld flash generating in the case of punching wholeheartedly by using the copolymerized polyester resin which permuted the ethylene glycol component in polyethylene terephthalate of the specific component as a result of research, and blending a specific modifier, without spoiling said effectiveness.

[0009] That is, the resin constituent for cards concerning invention of claim 1 comes to contain the subject resinous principle which consists of copolymerized polyester resin which permuted 10 - 70% of the ethylene glycol component in polyethylene terephthalate by cyclohexane dimethanol, and one sort or two sorts or more of modifiers chosen from synthetic rubber and styrene resin. Since non-vinyl chloride resin is used, while being able to respond to the request of environmental protection, since the specific rate permutation is carried out by cyclohexane dimethanol, weld flash generating at the time of piercing in the shape of a card type is prevented, the deburring work after a punch can be omitted, and it can produce with high productive efficiency. And mechanical strengths, such as impact strength, improve substantially, without spoiling the above-mentioned weld flash generating prevention effectiveness because the above-mentioned specific modifier contains.

[0010] In the resin constituent for cards of above-mentioned claim 1, invention of claim 2 adopts the configuration which comes to carry out 2-50 weight section content of the modifier to the subject resinous principle 100 weight section, and its mechanical strength improves further.

[0011] Invention of claim 3 adopts the configuration which a subject resinous principle consists of mixture of copolymerized polyester resin and polycarbonate resin, and has the weight ratio of copolymerized polyester resin / polycarbonate resin in the range of 20 / 80 - 90/10 in the resin constituent for cards of above-mentioned claims 1 or 2. Since weld

flash generating at the time of piercing in the shape of a card type is prevented much more certainly according to concomitant use of polycarbonate resin, it can produce with still higher productive efficiency. Furthermore, since the card which consists of this resin mixture has high thermal resistance moderately, while it can secure the outstanding thermal resistance which does not deform under an elevated temperature like [ in the automobile under stop under sunshine ], it has the advantage which can set the thermocompression bonding temperature of the sheet which printed the pattern etc. beforehand as the range which discoloration of printing ink does not produce.

[0012]

[Embodiment of the Invention] In this invention, the resin (henceforth "PETG resin") which permuted 10 - 70% of the ethylene glycol component in polyethylene terephthalate by cyclohexane dimethanol as copolymerized polyester resin which constitutes the subject resinous principle of the resin constituent for cards is used. In case said amount of permutations pierces in the shape of a card type at less than 10%, it is easy to generate weld flash, and deburring work is needed in this case, and productive efficiency falls. Moreover, when the amount of permutations exceeds 70%, fabricating-operation nature falls, as a result productive efficiency is made to fall. Especially, as for said amount of permutations, considering as 20 - 40% is desirable.

[0013] One sort or two sorts or more of modifiers chosen from synthetic rubber and styrene resin are made to contain to the subject resinous principle 100 weight section in said resin constituent. Thereby, mechanical strengths, such as impact strength, can be raised substantially.

[0014] As for the loadings of this modifier, it is desirable to consider as 2 - 50 weight section to the subject resinous principle 100 weight section. If improvement in mechanical strength sufficient in under 2 weight sections cannot be expected and it blends exceeding 50 weight sections on the other hand, since it will result in falling [ result ] rather than the reinforcement obtained with said suitable loadings, and increasing cost to \*\*, it is not desirable. Especially, it is more desirable to consider as 15 - 45 weight section.

[0015] Especially as said synthetic rubber, although not limited, EVA (ethylene-vinylacetate copolymer), EPR (ethylene-propylene rubber), BR (butadiene rubber), PB (polybutadiene), SBR (styrene butadiene rubber), NBR (acrylonitrile-butadiene rubber), etc. are mentioned, for example.

[0016] Especially as said styrene resin, although not limited, ABS plastics (acrylonitrile-butadiene-styrene copolymer), MBS resin (methyl-methacrylate-Butadiene Styrene), MABS resin (methyl-methacrylate-Butadiene Styrene), AAS resin (acrylic rubber-acrylonitrile styrene copolymer), ACS resin (acrylonitrile-chlorinated polyethylene-styrene copolymer), etc. are mentioned, for example.

[0017] In addition, if modifiers other than said synthetic rubber and styrene resin, for example, modifiers, such as PE (polyethylene), are used, in case it pierces about [ that improvement in sufficient mechanical strength is not expectable ] and in the shape of a card type, it will be easy to generate weld flash, and deburring work will be needed, and productive efficiency will be reduced.

[0018] It is desirable to make said resin constituent contain polycarbonate resin (henceforth "PC resin") further as a subject resinous principle. The mixture (henceforth "PETG/PC") of such PETG resin and PC resin is because high thermal resistance is

shown moderately and it excels also in the punching workability in a sheet gestalt.

[0019] That is, a card may be left in the location which is easy to become an elevated temperature for example, under sunshine like [ in the automobile under stop ]. Therefore, although a card is asked for the endurance under an elevated temperature, heat-resistant temperature conventionally sufficient by general-purpose vinyl chloride resin, the above-mentioned ABS plastics, and PET cannot be given. Moreover, if the resin ingredient which, on the other hand, has the very high thermal resistance of PC resin etc. is used, since it is necessary to set up temperature of heating sticking by pressure very highly (for example, PC resin 200 degrees C or more), there is a problem that ink, such as a pattern currently printed on the surface of a sheet, discolours at the time of heating sticking by pressure, and spoils commodity value. however, in aforementioned PETG/PC, since it is comparatively alike and heating sticking by pressure can be carried out at low temperature when thermal resistance higher than general-purpose vinyl chloride resin etc. is obtained, discoloration of the ink on the front face of a sheet is also avoidable.

[0020] Moreover, in this PETG/PC, since weld flash generating at the time of piercing in the shape of a card type is more certainly prevented compared with a PETG resin independent case, deburring work can be omitted and still higher productive efficiency can be secured.

[0021] As for the blending ratio of coal in PETG/PC, it is desirable to set the weight ratio of the former/latter as the range of 20 / 80 - 90/10. If the ratio of PETG resin becomes less than the above-mentioned range, since it is necessary to become near in a PC resin independent case, and to set up the temperature of heating sticking by pressure highly, there is concern which produces discoloration of ink, such as a pattern on the front face of a sheet. Moreover, since thermal resistance will fall if the ratio of PETG resin increases more than the above-mentioned range, it is not desirable. Especially, as for said weight ratio, it is more desirable to set it as the range of 30 / 70 - 85/15, and it is much more desirable to set it as the range of further 50 / 50 - 80/20.

[0022] Into the resin constituent of this invention, various additives, such as a pigment, a bulking agent, and an antiblocking agent, can be blended suitably if needed. Although it is usually blended in order that a pigment may give concealment nature to a card base material, especially white pigments are used suitably, it is cheap also in it and titanium oxide excellent in concealment nature is especially more suitable. As for the loadings of this pigment, it is desirable to consider as 1 - 20 weight section to the subject resinous principle 100 weight section. . Since concealment nature sufficient in under 1 weight section is not securable, even if it blends exceeding 20 weight sections preferably thru/or on the other hand, since it cannot expect, but it turns to the cost high up and a mechanical property also falls, a concealment disposition [ that it is balanced ] top is not desirable. Especially, it is more desirable to consider as 5 - 15 weight section.

[0023] Both a rutile mold and an anatase mold can be used as said titanium oxide. Moreover, it is desirable to use that the mean particle diameter of whose is 0.10-0.5 micrometers. Since distributed stability will fall if it exceeds 0.5 micrometers preferably thru/or on the other hand from an activity sanitary viewpoint that it is easy to disperse in air in less than 0.10 micrometers at the time of an activity for impalpable powder, it is not desirable. It is more desirable to use that whose mean particle diameter is 0.15-0.3 micrometers especially.

[0024] Moreover, in the resin constituent of this invention, various kinds of polymers in

the range which does not check that property can also be blended.

[0025] Furthermore, a foaming agent can also be blended with said resin constituent if needed. That is, using this foaming agent content resin constituent, a foaming resin sheet can be manufactured by extrusion molding, and it can also consider as a card base material using this. Under the present circumstances, as for the loadings of a foaming agent, it is desirable to consider as the range of 0.5 - 2 weight section to the subject resinous principle 100 weight section. When under the 0.5 weight section is inadequate in foaming and 2 weight sections are exceeded, a sheet has the concern which a hole vacancy generates.

[0026] Although it especially faces producing a card base material using the resin constituent for cards of this invention and is not limited, that what is necessary is just to fabricate in the shape of a sheet, for example with calender shaping, extrusion molding, injection molding, etc., press forming of this sheet is usually carried out in piles, it unifies, and a card base material is manufactured.

[0027] <BR> [Example] Next, the concrete example of this invention is explained.

[0028] 0.28mm in thickness and a 0.54mm shaping sheet were produced by extrusion molding using the resin constituent blended at a rate which shows the ingredient shown in examples 1-6 and the <examples 1-3 of comparison> table 1 in a table 1. The laminating sheet on which these two shaping sheets were put was unified by press forming, and 54mm long, 86mm wide, and a card base material with a thickness of 0.8mm were produced by piercing this to card type voice.

[0029] It is JIS about the Izod impactive strength of said shaping sheet. While measuring based on K6745, the tightness of weld flash generating at the time of piercing to card type voice was evaluated based on the following criterion.

[0030] There is no generating of <weld flash generating tightness> weld flash. -- "O"  
Although weld flash generating arises rarely, high productive efficiency can be secured very few. -- "O"

Weld flash generating reduces productive efficiency very mostly. -- "x"

It is JIS about the softening temperature of <heat-resistant assessment> each shaping sheet. It measured based on K6734 and this softening temperature was made into the index of heat-resistant assessment.

[0031]

[A table 1]



[0032] The sheet of examples 1-6 manufactured using the resin constituent concerning this invention is excellent also in the weld flash generating tightness at the time of piercing to card type voice while it is excellent in impact strength, so that clearly from the <assessment result> table 1. Furthermore, with the sheet of examples 5 and 6, thermal resistance improves upwards further and weld flash generating in the case of punching can be prevented more certainly.

[0033] On the other hand, in the examples 1-3 of a comparison which deviate from the range of this invention, sufficient impact strength is not obtained, and it is inferior also to weld flash generating tightness in the examples 2 and 3 of a comparison, and productive efficiency becomes low.

[0034]

[Effect of the Invention] As mentioned above, the resin constituent for cards concerning invention of claim 1 It is a thing using the copolymerized polyester resin which permuted 10 - 70% of the ethylene glycol component in polyethylene terephthalate by cyclohexane dimethanol as subject resin. While being able to respond to the request of environmental protection by using non-vinyl chloride resin Since the specific rate permutation is carried out by cyclohexane dimethanol, weld flash generating at the time of piercing in the shape of a card type can be prevented effectively, as a result the deburring work after a punch can be omitted, and it can produce with high productive efficiency. Furthermore, mechanical strengths, such as impact strength, can be raised substantially, without spoiling the above-mentioned weld flash generating prevention effectiveness, since one

sort or two sorts or more of modifiers chosen from synthetic rubber and styrene resin are contained.

[0035] According to invention of claim 2, a mechanical strength can be raised further.

[0036] According to invention of claim 3, according to concomitant use of polycarbonate resin, weld flash generating at the time of piercing in the shape of a card type can be prevented much more certainly, and it can produce with still higher productive efficiency. Furthermore, since the card which consists of this resin mixture has high thermal resistance moderately, it does not have discoloration of the pattern which can secure upwards the outstanding thermal resistance which does not deform under an elevated temperature like [ in the automobile under stop under sunshine ], and was printed by the front face, and can offer a high-definition card.

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[Translation done.]

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